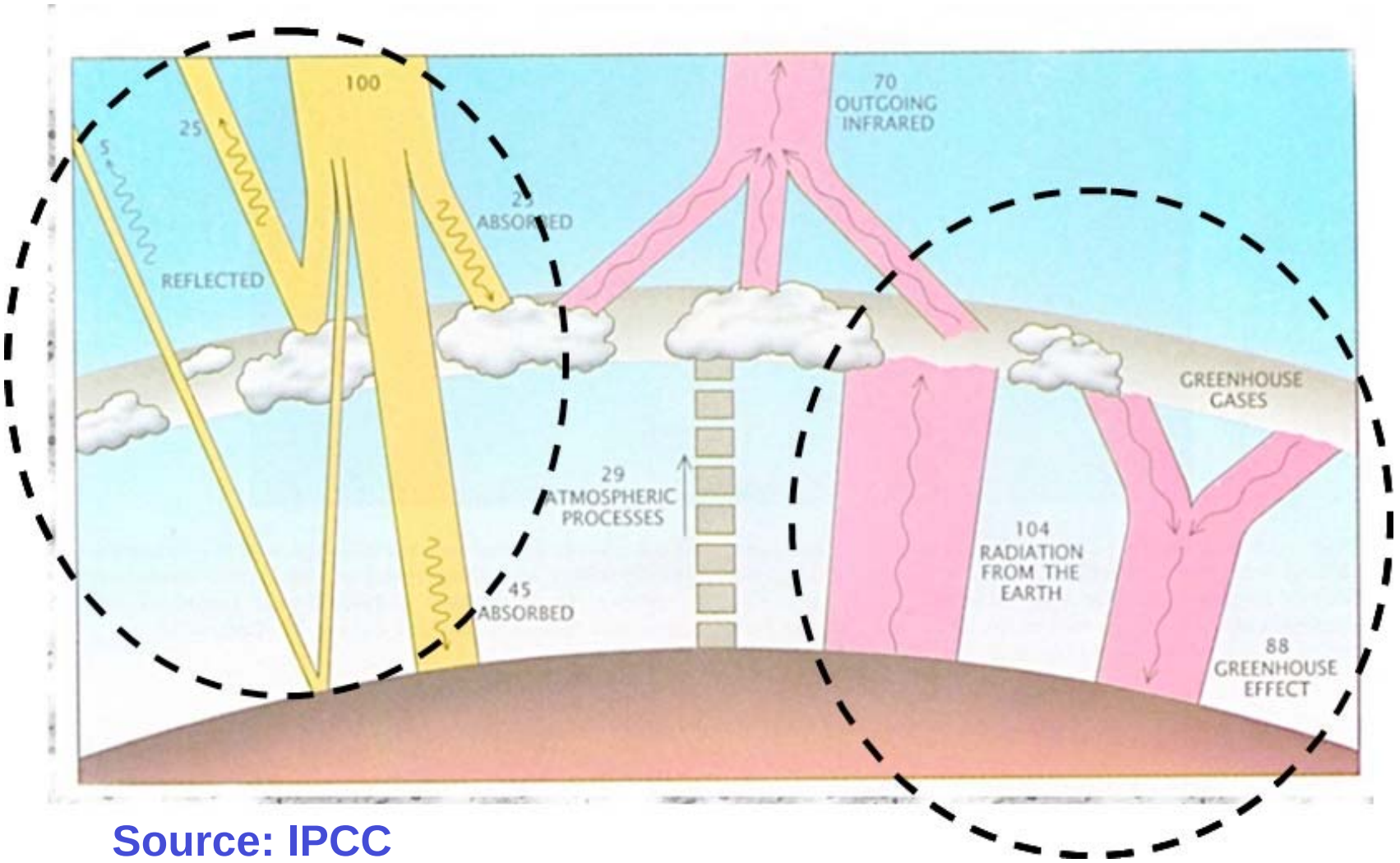
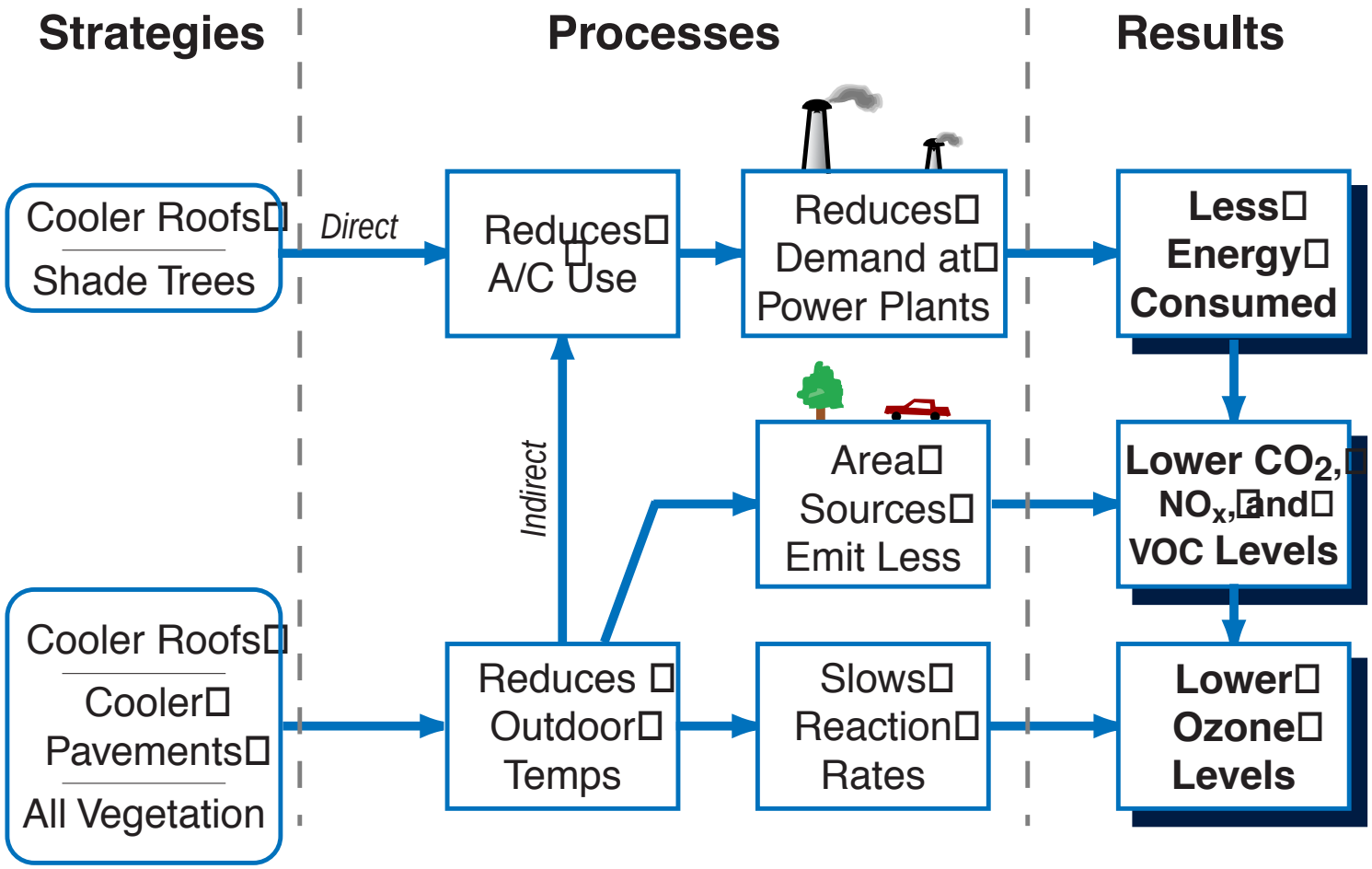
Backup Slides on Cool Colored Roofs, Pavements and Cars

Solar Reflective Surfaces Also Cool the Globe



Source: IPCC

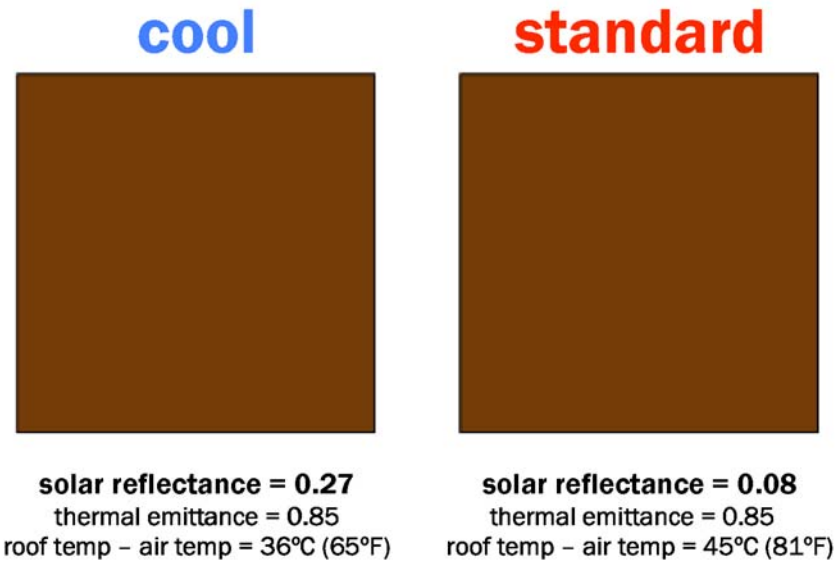
Methodology: Energy and Air-Quality Analysis

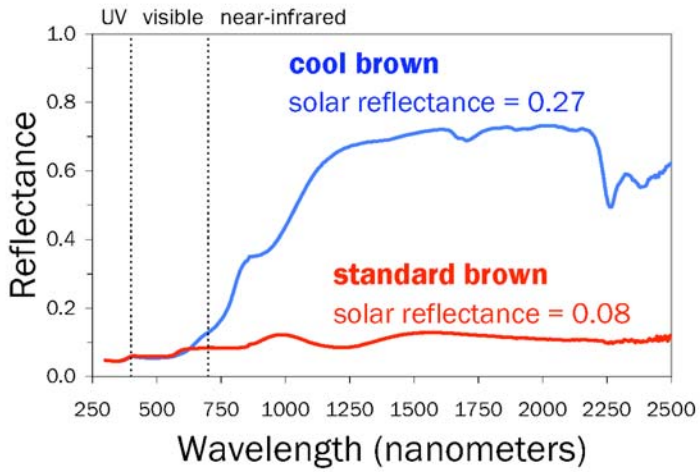


Cool and Standard Brown Metal Roofing Panels

- Solar reflectance ~ 0.2 higher
- Afternoon surface temperature ~ 10ºC lower

Courtesy BASF Coatings





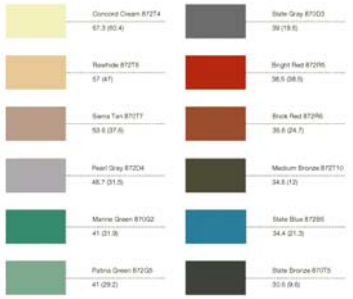
Designing Cool Colored Roofing

cool concrete tile R ≥0.40	R=0.41 *black*	R=0.44 *blue*	R=0.44 *gray*	R=0.48 *terracotta*	R=0.46 *green*	R=0.41 *chocolate*
standard concrete tile (same color)	R=0.04	R=0.18	R=0.21	R=0.33	R=0.17	R=0.12
solar reflectance gain =	**+0.37**	**+0.26**	**+0.23**	**+0.15**	**+0.29**	**+0.29**

Courtesy American Rooftile Coatings

cool clay tile R ≥0.40

Courtesy MCA Clay Tile



cool metal R ≥0.30

Courtesy BASF Industrial Coatings

cool fiberglass asphalt shingle R ≥0.25

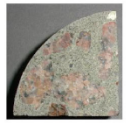
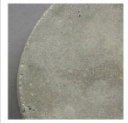
Courtesy Elk Corporation

Cool is Cool: From Cool Color Roofs to Cool Color Cars and Cool Jackets

- Toyota experiment (surface temperature 10K cooler)
- Ford is also working on the technology

Courtesy: BMW (http://www.ips-innovations.com/solar_reflective_clothing.htm)

Cool Paving Materials:

Concrete	**(a)** Unexposed	**(b)** Weathered	**(c)** Weathered, wetted	**(d)** Soiled	**(e)** Abraded	**(f)** Formed
C1:S1:R2 gray cement/ riverbed sand/ granite rock	 ρ=0.44	 ρ=0.34	 ρ=0.14	 ρ=0.43	 ρ=0.24	 ρ=0.25

Reflective Pavements are Cooler

- **Fresh asphalt**

Albedo: 0.05
Temperature: 123°F

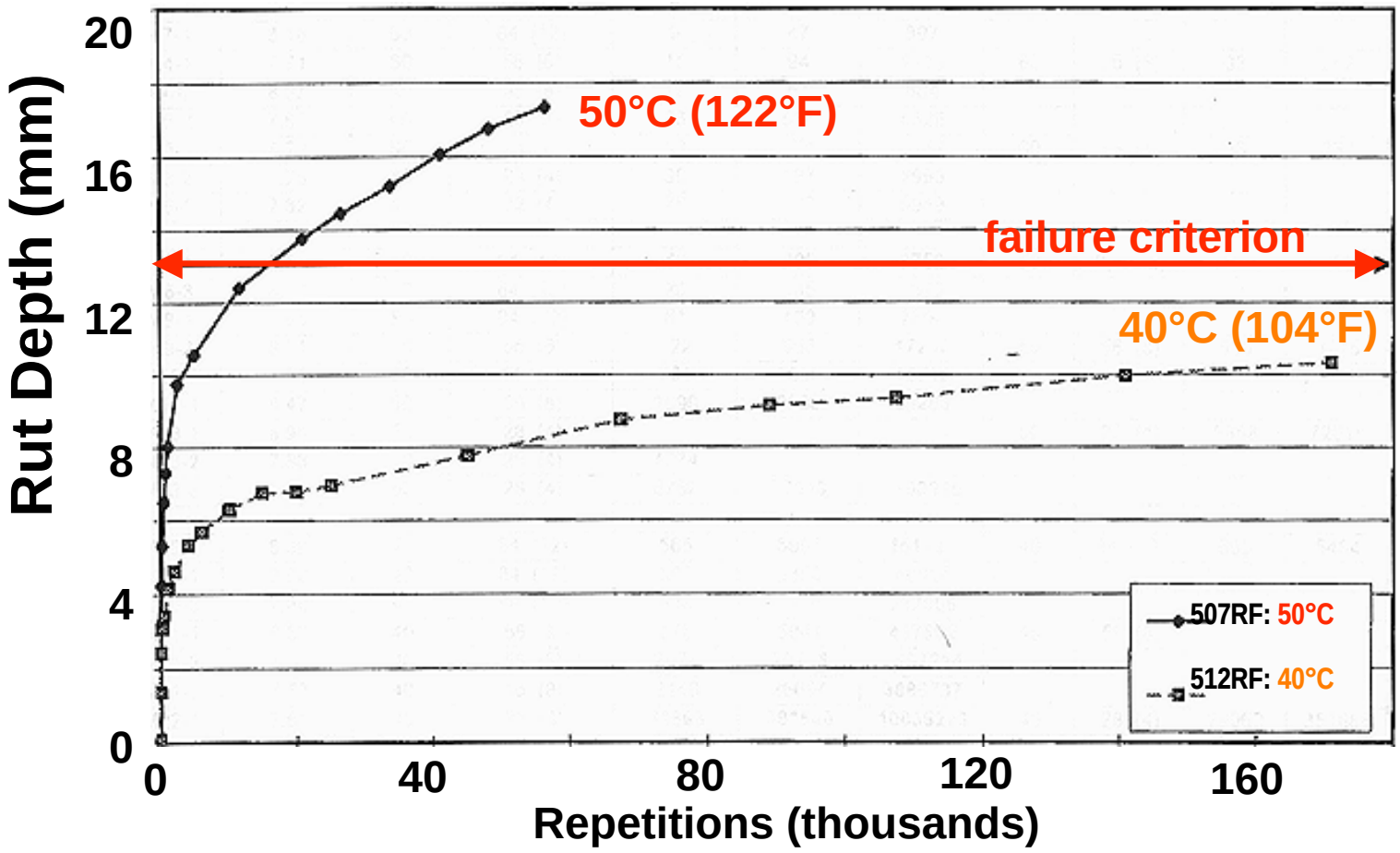
- **Aged asphalt**

Albedo: 0.15
Temperature: 115°F

- **Prototype asphalt coating**

Albedo: 0.51
Temperature: 88°F

Temperature Effect on Rutting

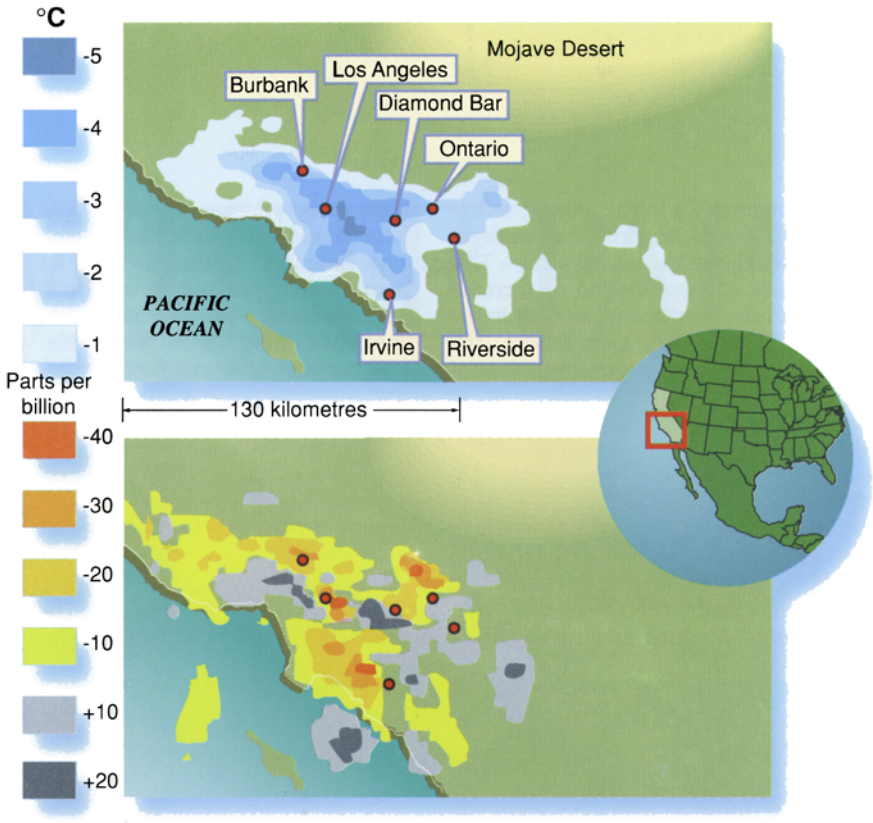


Source: Dr. John Harvey, UC B Civil Engineering, Inst. Transpo. Studies

Simulated Meteorology and Air-quality Impacts in LA

Temperature Change

Ozone Concentration Change



Potential Savings in LA

- **Savings for Los Angeles**
  - Direct, $100M/year
  - Indirect, $70M/year
  - Smog, $360M/year

- **Estimate of national savings: $5B/year**